

SOM-5780 SOM-Express Module

Intel® Pentium® M SOM-Express Module with CPU, VGA/LVDS, Audio & LAN

Users' Manual

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This manual is for the SOM-5780

Part No. 2006578000

1st Edition, Printed May 2006

Packing List

Before you begin installing your card, please make sure that the following materials have been shipped:

- 1 SOM-5780 System On Module CPU module
- CD-ROM or Disks for utility, drivers, and manual (in PDF format)
- Heatsink

If any of these items are missing or damaged, contact your distributor or sales representative immediately.

Additional Information and Assistance

1. Visit the Advantech web site at **www.advantech.com** where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance.

Please have the following information ready before you call:

- . Product name and serial number
- . Description of your peripheral attachments
- . Description of your software (operating system, version, application software, etc.)
- . A complete description of the problem
- . The exact wording of any error messages

Version History

May, 2006 (manual no. 2006578000) SOM-5780

This device complies with the requirements in part 15 of the FCC rules: Operation is subject to the following two conditions:

FCC

- 1. This device may not cause harmful interference, and*
- 2. This device must accept any interference received, including interference that may cause undesired operation*

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this device in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his/her own expense. The user is advised that any equipment changes or modifications not expressly approved by the party responsible for compliance would void the compliance to FCC regulations and therefore, the user's authority to operate the equipment.

Caution!



There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

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General Information

This chapter gives background information on the SOM-5780 CPU System On Module.

Sections include:

- Introduction
- Specifications
- Board Dimensions

Chapter 1 Introduction

1.1 Introduction

SOM-5780 is an Intel 915GM/ICH6-M SOM-Express CPU module following the COM Express Type 2 and basic form factor that fully complies with the COM Express of PCI Industrial Computer Manufacturers, PICMG. The new CPU module has an onboard Intel® Pentium® M processor and Intel 915GM/ICH6-M chipset which supports faster PCI Express and SATA interfaces. The SOM-5780 provides a scalable high performance and easy to integrate solution for customers' applications by utilizing a plug-in CPU module on an application-specific customer solution board. The SOM-5780 with advanced I/O capacity incorporates serial differential signaling technologies such as PCI Express, Serial ATA, USB 2.0, LVDS and serial DVO interfaces. SOM-5780FL offers design partners more choices for their own applications needing higher computing speeds while maintaining a compact form factor.

SOM-5780 complies with the "Green Function" standard and supports Doze, Standby and Suspend modes. The small size (95 mm x 125 mm) and use of two high capacity connectors based on the proven SOM-Express form factor, allow the SOM-Express modules to be easily and securely mounted onto a customized solution board or our standard SOM-DB5700 development board.

The SOM-5780 is a highly integrated multimedia SOM that combines audio, video, and network functions. It provides high definition audio interface (AC97/Azalia), 25 to 112 MHz single/dual channel LVDS panels with up to 32MB system memory. Major on-board devices adopt LVDS signal technology to achieve outstanding computing performance when used with Intel® Pentium® M processors.

1.2 Specifications

1.2.1 Standard System On Module functions

- **CPU:**
 - Intel® Pentium® M processor w/64KB primary cache memory
 - Intel® Celeron® M processor w/64KB primary cache memory
- **BIOS:** Award 4 Mbit Flash BIOS
- **Chipset:** Intel® 915GM GMCH/ICH6-M Chipset 533 MHz FSB
- **Cache memory:** Up to 2 MB on the Pentium M processor or 1 MB on the Celeron M processor
- **System memory:** 1 x 200-pin SODIMM socket, Double Data Rate 2 (DDR2) 128 MB to 2 GB, DDR2 400/533 MHz.
- **Power management:** Supports power saving modes including Normal/Standby/Suspend modes. APM1.2/ACPI 1.0 compliant
- **Enhanced IDE interface:** 1 EIDE channel. BIOS auto-detect, PIO Mode3 or Mode4. UDMA/66 transfer
- **Watchdog timer:** 256 level timer interval, from 0 to 255 sec. or min setup by software, jumperless selection, generates system reset
- **Keyboard/mouse:** Supports standard PC/AT keyboard and PS/2 mouse interface
- **USB interface:** Eight USB connectors compliant with USB Spec. Rev. 2.0

1.2.2 VGA/flat panel Interface

- **Chipset:** Intel 915GM, supports PCI Express Based Interface, 1.05V core voltage
- **Frame buffer:** Supports 1/8 MB frame buffer with system memory
- **Display type:** Supports CRT and LCD panel displays and has a dual channel LVDS interface
- **Display mode:** CRT Mode: up to 400 MHz max DAC frequency and 24-bit RAMDAC support, DDC2B compliant and up to 2048 x 1536 mode support; LCD/Simultaneous Modes: 25 to 112 MHz single/dual channel LVDS interface. Up to UXGA TFT panel type

1.2.3 Audio function

- SOM-DB5700 supports ALC880D via Azalia interface
- **Audio interface:** AC97, Intel high definition audio interface –Azalia

1.2.4 LAN

- **Chipset:** Intel 82562GZ/82541P1(Optional for Gigabit Ethernet)
- Ethernet interface: IEEE 802.3U compatible 100/10Base-T interface includes software drivers and boot ROM

1.2.5 Mechanical and environmental

- **Dimensions:** (L x W): SOM-Express form factor, 125 mm x 95 mm (4.92" x 3.74")
- **Power supply voltage:** +5V standby and +12 V power
- **Power requirements:**
 - Max: +12 V@2.75A (Pentium M 2.0 GHz)
 - Typical: (w/1GB DDR 533)
 - +12V@1.94A (Intel Pentium M 2.0 GHz),
 - +12V@1.72A (Intel Pentium M 1.8 GHz),
 - +12V@1.45A (Intel Pentium M 1.4 GHz),
 - +12V@1.45A (Intel Pentium M 1.0 GHz)
- **Operating temperature:** 0 ~ 60° C (32 ~ 140° F)
- **Operating humidity:** 0% ~ 90% Relative Humidity, Noncondensing
- **Weight:** 0.103 Kg (weight of total package)

1.3 Board Dimensions

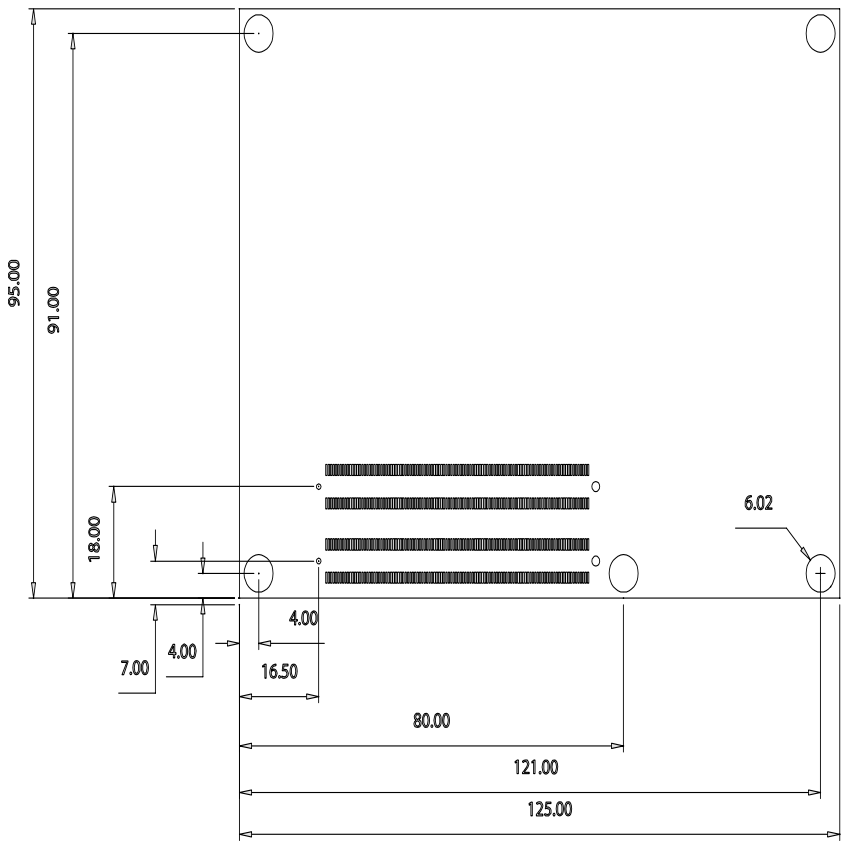


Figure 1.1: SOM-5780 Dimensions

1.4 Board layout

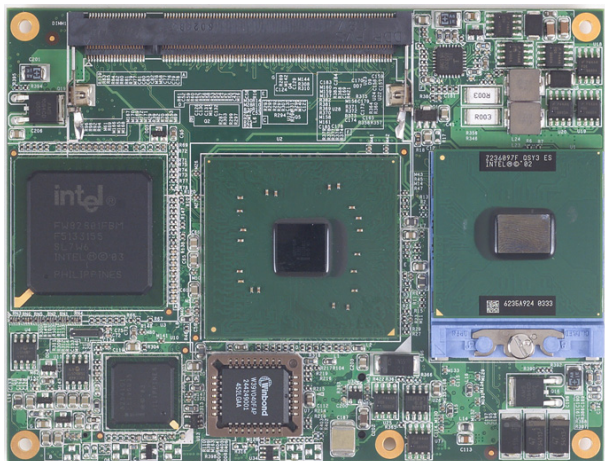


Figure 1.2: SOM-5780 Top View

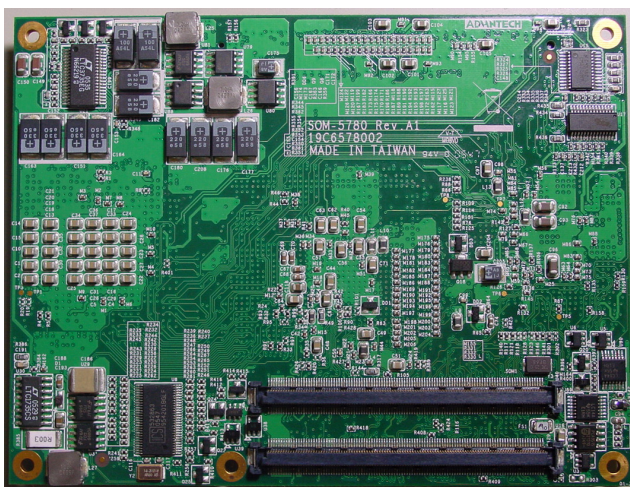


Figure 1.3: SOM-5780 Solder View

Connector Assignments and Descriptions

This chapter tells how to set up the SOM-5780 hardware. It includes instructions on connecting peripherals, switches and indicators. Make sure you read all the safety precautions before you begin the installation procedure.

Chapter 2 Connector Assignments

2.1 Connector Locations

The board has a number of connectors that allow you to configure your system to suit your application.

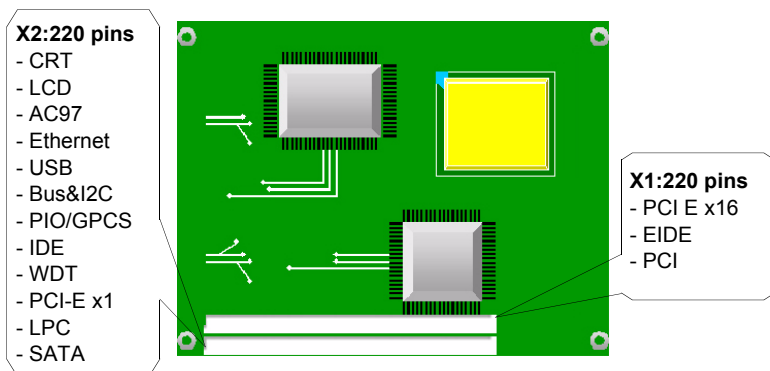


Figure 2.1: SOM-5780 Locating Connectors

2.2 Pin Assignments for X1 connectors

Please refer to SOM-ETX Design and Specification Guide, Chapter 2

2.3 Safety precautions

Warning! *Always completely disconnect the power cord from your board whenever you are working on it. Do not make connections while the power is on, because sensitive electronic components can be damaged by a sudden rush of power.*

Caution! *Always ground yourself to remove any static charge before touching the board. Modern electronic devices are very sensitive to static electric charges. Use a grounding wrist strap at all times. Place all electronic components on a static-dissipative surface or in a static-shielded bag when they are not in use.*

CHAPTER 3

Software Configuration

Chapter 3 Software Configuration

3.1 Introduction

The SOM-5780 system BIOS and custom drivers are located in a 512 KB, 32-pin Flash ROM. A single Flash chip holds the system BIOS and VGA BIOS. The display type can be configured via software. This method minimizes the number of chips and eases configuration. You can change the display BIOS simply by reprogramming the Flash chip.

3.2 Utility CD disk

The SOM-5780 is supplied with a software utility on CDROM. This disk contains the necessary file for setting up the VGA display. Directories and files on the disk are as follows:

	AWDFLASH.EXE
	5780Vxxx.BIN

AWDFLASH.EXE

This program allows you to update the BIOS Flash ROM. 5780Vxxx. This binary file contains the system BIOS.

1. Apply power to the SOM-5780 application with a color TFT display attached. This is the default setting for the SOM-5780 series. Make sure that the AWDFLASH.EXE and *.BIN files are located in the working drive.

Note: *Make sure that you do not run AWDFLASH.EXE while your system is operating in EMM386 mode.*

2. At the prompt, type AWDFLASH.EXE and press <Enter>. The VGA configuration program will then display the following:

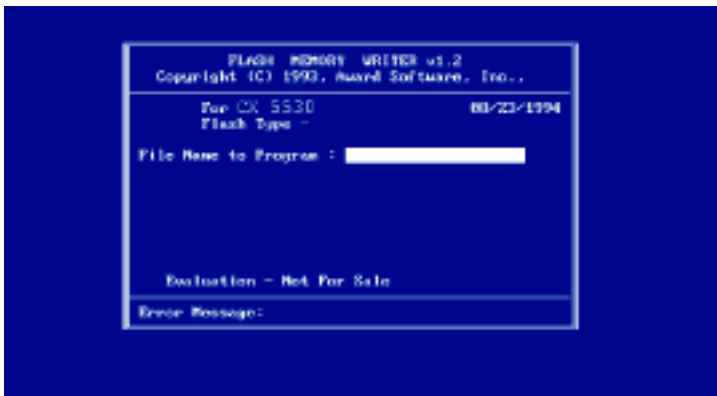


Figure 3.1: BIOS setup screen

3. At the prompt, type in the BIN file which supports your display. When you are sure that you have entered the file name correctly press <Enter>. The screen will ask “Do you want to save?” If you wish to continue press Y. If you change your mind or have made a mistake press N.
4. If you decide to continue, the screen will issue a prompt which will then ask “Are you sure to program (Y/N)?” If you wish to continue, press Y. Press N to exit the program.

3.3 VGA display software configuration

The SOM-5780 on-board VGA/LCD interface supports an 18-bit LCD, flat panel displays and traditional analog CRT monitors. The interface can drive CRT displays with resolutions up to 2048 x 1536, MHz DAC frequency 400 MHz and 24-bit RAMDAC support. It is also capable of driving color panels up to UXGA panel resolution and 25 to 112 MHz single/dual channel LVDS interface. The LCD type is configured completely via the software utility, so you do not have to set any jumpers.

3.4 Connections for two channel LVDS

3.4.1 SOM-5780 X2

Table 3.1: LVDS signal descriptions

Pin	Signal	I/O	Description
A71,73,75,78 A72,74,76,79	LVDS_A[0:3]+ LVDS_A[0:3]-	O	LVDS Channel A differential pairs
A81 A82	LVDS_A_CK+ LVDS_A_CK-	O	LVDS Channel A differential clock
B71,73,75,77 B72,74,76,78	LVDS_B[0:3]+ LVDS_B[0:3]-	O	LVDS Channel B differential pairs
B81 B82	LVDS_B_CK+ LVDS_B_CK-	O	LVDS Channel B differential clock
A77	LVDS_VDD_EN	O	LVDS panel power enable
B79	LVDS_BKLT_EN	O	LVDS panel backlight enable
B83	LVDS_BKLT_CTRL	O	LVDS panel backlight brightness control
A83	LVDS_I2C_CK	O	I2C clock output for LVDS display use
A84	LVDS_I2C_DAT	O	I2C data line for LVDS display use

Graphic Setup

Introduction

Installation of Graphic drivers for Windows 2000/XP

Further information

Chapter 4 Graphic Setup

4.1 Introduction

The SOM-5780 has an onboard PCI/AGP flat panel/VGA interface. The specifications and features are described as follows:

4.1.1 Chipset

The SOM-5780 uses an Intel 915GM for its graphic controller. It supports LVDS LCD displays, and CRT monitors.

4.1.2 Display memory

The 915GM chip can support up to 8MB dynamic frame buffer shared with system memory; the VGA controller can drive CRT displays up to DAC frequency 400 MHz and 24-bit RAMDAC support, color panel displays in LVDS model with resolutions up to UGXA panel resolution with frequency range from 25 MHz to 112 MHz.

4.1.3 Display types

CRT and panel displays can be used simultaneously. The SOM-5780 can be set to one of three configurations: CRT only, LVDS only, both CRT and LFP (LVDS). The system is initially set to simultaneous display mode - CRT and LFP (LDVS). If you want to enable the other display mode, please set up manually. A set up example is shown as in the following chapters.

4.1.4 Dual/Simultaneous Display

The SOM-5780 uses an Intel 915GM controller that is capable of providing simultaneous dual view display of the same content on a flat panel and CRT.

To set up dual view (simultaneous mode) under Windows 2000/XP, follow these steps:

Step 1. Open the Control panel, and select "Display", "Settings".

Step 2. Select "Advanced."

Step 3. Select "Graphic Properties."

Step 4. Select "Devices" mode and click "OK."

Step 1. and 2.

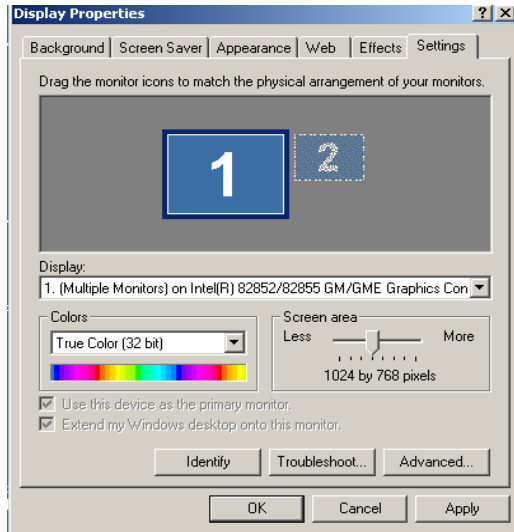


Figure 4.1: Open Control panel

Step 3.

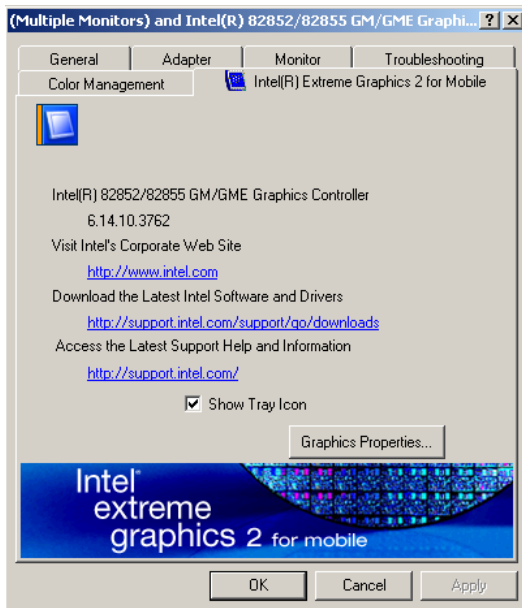


Figure 4.2: Selecting Graphic Properties

Step 4.

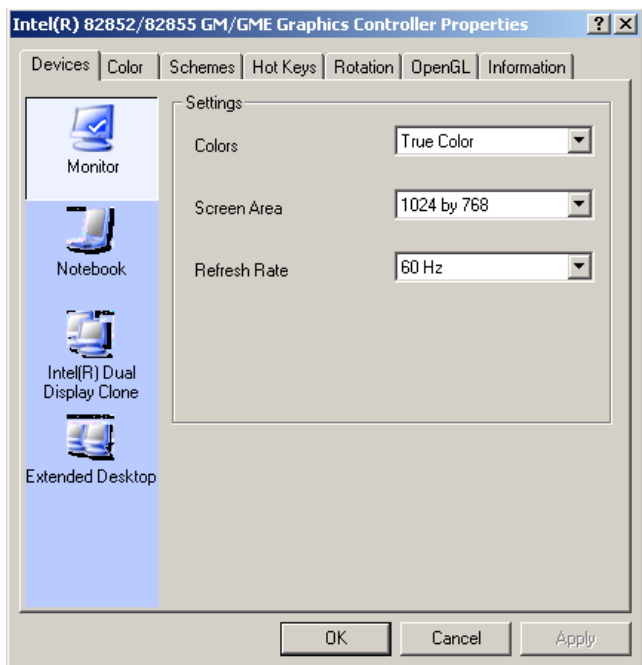


Figure 4.3: Selecting Display Settings

4.2 Installation of the Graphic driver

Complete the following steps to install the PCI graphic driver. Follow the procedures in the flow chart that apply to the operating system that you are using within your SOM-5780.

- Notes:**
- 1. The windows illustrations in this chapter are intended as examples only. Please follow the listed steps, and pay attention to the instructions which appear on your screen.*
 - 2. For convenience, the CD-ROM drive is designated as "D" throughout this chapter.*

4.2.1 Installation for Windows 2000/XP

To install the Graphic driver for Windows 2000/XP, please run the set up wizard "Intel Extreme Graphic 2" in the CD-ROM. An example of installation steps is shown as below:

1. Follow Driver Setup Wizard instructions, then click "Next."

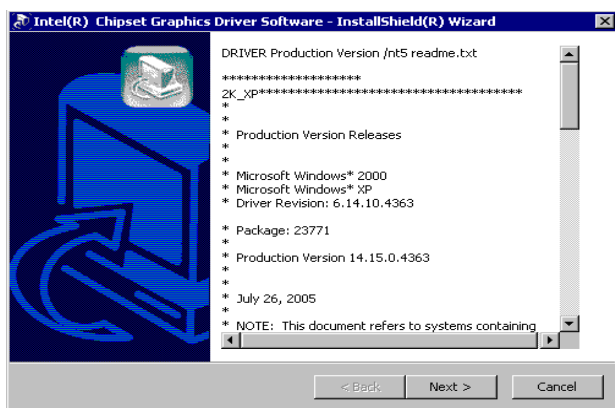


Figure 4.4: Graphic Driver Setup 1

2. Click "Next."

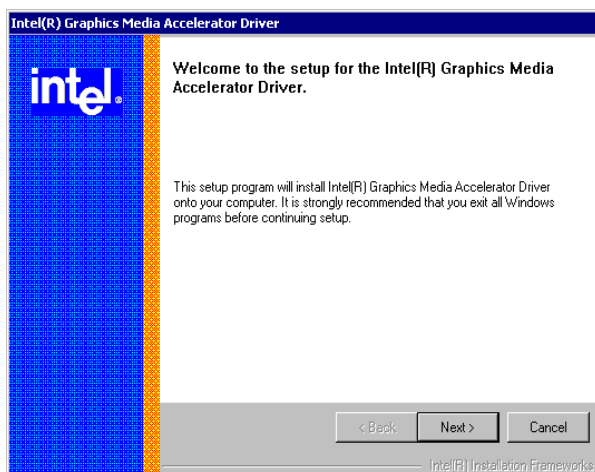


Figure 4.5: Graphic Driver Setup 2

3. Click "Yes" to go next step.



Figure 4.6: Graphic Driver Setup 3

4. Click "Finish" to exit.

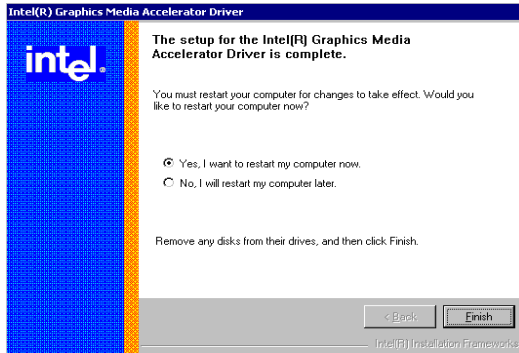


Figure 4.7: Graphic Driver Setup 4

4.3 Further Information

For further information about the AGP/VGA installation in your SOM-SOM-5780, including driver updates, troubleshooting guides and FAQ lists, visit the following web resources:

Advantech websites: www.advantech.com
www.advantech.com.tw

Audio Setup

This chapter provides instructions for installing the audio software drivers included on the installation CD.

Chapter 5 Audio Setup

5.1 Introduction

The SOM-5780 provides both AC97 and Azalia-Intel high definition audio interface and uses Intel ICH6M audio interface to provide high-quality stereo sound. The audio interface can record, compress, and playback voice, sound, and music with built-in mixer control. If you use AC97 as the audio codec, you might refer to the following audio driver installation procedure.

5.2 Driver installation

5.2.1 Before you begin

Please read the instructions in this chapter carefully before you attempt installation. If using Advantech SOM-DB5700 as the carrier board, you can get the audio drivers located on the audio driver CD. Run the supplied SETUP program to install the drivers; don't copy the files manually.

- Note:**
1. *Before trying to install the driver, go to Chapter 3 and use the "Chipset Software Installation Utility" first.*
 2. *The files on the software installation diskette are compressed. Do not attempt to install the drivers by copying the files manually. You must use the supplied SETUP program to install the drivers.*

5.2.2 Windows 2000/XP drivers

Step 1. To install an Audio driver for Windows 2000/XP, please run the "Install Shield Wizard for Realtek AC'97 Audio on the CD-ROM. Example of installation steps is shown as below.

Click “Next” to continue.



Figure 5.1: Audio Setup 1

Step 2. Click “Finish” from Windows to complete audio driver installation.



Figure 5.2: Audio Setup 2

LAN Configuration

- Introduction
- Features
- Installation of Ethernet Driver for:
 - Windows 2000/XP Drivers Setup Steps
 - Windows Wake-on-LAN Setup

Chapter 6 Ethernet Interface

6.1 Introduction

The SOM-5780 is equipped with a high-performance 8-bit Ethernet chipset which is fully compliant with IEEE 802.3 10 Mbps CSMA/CD standards. It is supported by major network operating systems. It is also both 100Base-T and 10Base-T compatible.

6.2 Features

- Intel 82562GZ 10/100Base-T Ethernet LAN controller
- Optional Intel 82541PI 10/100/1000 Base-T Ethernet LAN controller
- Supports Wake-on-LAN remote control function
- PCI Bus Master complies with PCI Rev. 2.2
- Complies with 100Base-TX, and 10Base-T applications
- Single RJ-45 connector gives auto-detection of 10 Mbps or 100 Mbps network data transfer rates and connected cable types
- Enhancements on ACPI & APM
- Complies with PCI Bus Power Management Interface Rev. 1.1
- ACPI Rev. 2.0, and Device Class Power Management Rev. 1.0

6.3 Installation of Ethernet Driver

Before installing the Ethernet driver, note the procedures below. You must know which operating system you are using in your SOM-5780, and then refer to the corresponding installation procedure. Then just follow the steps described. You will quickly and successfully complete the installation, even if you are not familiar with instructions for Windows.

Note: *The windows illustrations in this chapter are examples only. You must follow the flowchart instructions and pay attention to the instructions which appear on your screen.*

6.3.1 Installation for Windows 2000/XP

Note: The CD-ROM drive is designated as "D" throughout this section.

1. Click "Setup" icon in path "D:\SOM\SOM-ETX\5780\LAN"
If you accept the license agreement, press "Next" to go to next step.



Figure 6.1: Ethernet Driver Setup 1

2. Click “Install Drivers” to continue the installation process.

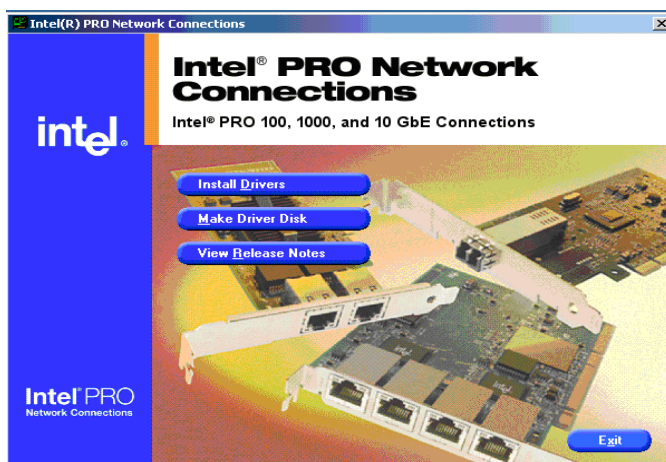


Figure 6.2: Ethernet Driver Setup 2

3. When you see the "Network cable unplugged" message, the installation is done.



Figure 6.3: Ethernet Driver Setup 3

6.3.2 Further information

Intel website: www.intel.com

Advantech websites: www.advantech.com
 www.advantech.com.tw

Programming the Watchdog Timer

The SOM-5780 is equipped with a watchdog timer that resets the CPU or generates an interrupt if processing comes to a standstill for any reason. This feature ensures system reliability in industrial standalone or unmanned environments.

Appendix A Programming Watchdog Timer

A.1 Watchdog Timer register

1. SMBus Address: Pin 3 internal pull up 100K = 0X9C, External pull up 4.7K = 0X6E
2. Enable WDT function: Configuration and function select register Index-03h

Table A.1: Index-03h

1-0	PIN10_MODE	R/W	VS _{B3V}	00:GPIO10 01: LED10 IN this mode can use REG 0x06(bit1,0) to select LED frequency. 10,11 :WD_OUT
-----	------------	-----	-------------------	--------------------------------------------------------------------------------------------------

3. Watchdog Control: Watchdog Timer Control Register – Index 36h
Power-on default [7:0] =0000_0000b

Table A.2: Watchdog Timer Index 36h

Bit	Name	R/W	PWR	Description
7	Reserve d	RO	VS _{B3V}	Reserved. Read will return 0.
6	STSWD TMO UT	R/W	VS _{B3V}	Watchdog is timeout. When the watchdog is timeout, this bit will be set to one. If set to 1, write 1 will clear this bit. Write 0, no effect.
5	WD ENABL E	R/W	VS _{B3V}	Enable watchdog timer.
4	WD PULSE	R/W	VS _{B3V}	Watchdog output level or pulse. If set 0 (default), the pin of watchdog is level output, if write 1, the pin will output with a pulse.
3	WD UNIT	R/W	VS _{B3V}	Watchdog unit select. Default 0 is select second. Write 1 to select minute.

Table A.2: Watchdog Timer Index 36h

2	WD HAC- TIVE	R/W	VS3V	Program WD2 output level. If set to 1 and watchdog asserted, the pin will be high. If set to 0 and watchdog asserted, this pin will drive iow (default).
1-0	WD_PS WIDTH	R/W	VS3V	Watchdog pulse width selection. If the pin output is selected to pulse mode. The pulse width can be choice. 00b- 1m second. 01b- 20m second. 10b -100m second 11b- 4 second

4. Watchdog reset timing control: Watchdog Timer Range Register – Index 37h

Power-on default [7:0] = 0000_0000b

Table A.3: Watchdog Timer Range – Index 37h

Bit	Name	R/W	PWR	Description
7-0	WD_TIME	R/W	VS3V	Watchdog timing range from 0 - 255. The unit is either second or minute programmed by the watchdog timer control register bits.

Programming GPIO

- This chapter gives the illustration of the General Purpose Input and Output pin setting.

Appendix B Programming GPIO

B.1 GPIO Register

1. Configuration and function select Register - Index 03h

Table B.1: Index 03h

4-3	PIN12_ MODE	R/W	VSB3V	00: GPIO12 01: LED12 IN tills mode can use REG Ox06(bit5,4) to select LED fre- quency. 10: IRQ 11:WDTOUT11#:
2	PIN11_ MODE	R/W	VSB3V	0: GPIO11 1: LED11 IN this mode can use REG Ox06(brt3,2) to select LED frequency.

2. Configuration and function select Register - Index 04h

Table B.2: Index 04h

1	PIN5_ MODE	R/W	VSB3V	0: GPIO17 1: LED17 IN this mode can use REG Ox07(bit7, 6) to select LED frequency.
0	PIN4_ MODE	R/W	VSB3V	0: GPIO16 1: LED16 IN this mode can use REG Ox07(bit5, 4) to select LED frequency.

3. Configuration and function select Register - Index 05h

Table B.3: Index 05h

2	PIN23_ MODE	R/W	VSB3V	0: GPIO24 1: LED24 IN this mode can use REG 0x09 (bit 1, 0) to select LED frequency.
1	PIN22_ MODE	R/W	VSB3V	0: GPIO25 1: LED25 IN this mode can use REG 0x09 (bit 3, 2) to select LED frequency.
0	PIN21_ MODE	R/W	VSB3V	0: GPIO26 1: LED26 IN this mode can use REG 0x09 (bit5, 4) to select LED frequency.

4. GPIOx Output Control Register - Index 10h

Table B.4: Index 10h

Bit	Name	R/W	PWR	Description
7	GP17JX CTRL	R/W	VSB3V	GPIO 17 output control. Set to 1 for output function. Set to 0 for input function (default).
6	GP16_O CTRL	R/W	VSB3V	GPIO 16 output control. Set to 1 for output function. Set to 0 for input function (default).
2	GP12JD CTRL	R/W	VSB3V	GPIO 12 output control. If this pin serves as IRQ/SMI#. this bit has no effect. Set to 1 for output function. Set to 0 for input function (default).
1	GP11_O CTRL	R/W	VSB3V	GPIO 11 output control. Set to 1 for output function. Set to 0 for input function (default).

5. GPIO2x Output Control Register - Index 20h

Table B.5: Index 20h

Bit	Name	R/W	PWR	Description
7	GP27_O CTRL	R/W	VSB3V	GPIO 27 output control. Set to 1 for output function. Set to 0 for input function (default).
6	GP26_O CTRL	R/W	VSB3V	GPIO 26 output control. Set to 1 for output function. Set to 0 for input function (default).
5	GP25_O CTRL	R/W	VSB3V	GPIO 25 output control. Set to 1 for output function. Set to 0 for input function (default).
4	GP24_O CTRL	R/W	VSB3V	GPIO 24 output control. Set to 1 for output function. Set to 0 for input function (default).
3	GP23_O CTRL	R/W	VSB3V	GPIO 23 output control. Set to 1 for output function. Set to 0 for input function (default).
2	GP22_O CTRL	R/W	VSB3V	GPIO 22 output control. Set to 1 for output function. Set to 0 for input function (default).
1	GP21_O CTRL	R/W	VSB3V	GPIO 21 output control. Set to 1 for output function. Set to 0 for input function (default).
0	GP20_O CTRL	R/W	VSB3V	GPIO 20 output control. Set to 1 for output function. Set to 0 for input function (default).

6. GPIOx Output Data Register - Index 11h

Table B.6: Index 11h

Bit	Name	R/W	PWR	Description
7	GP17JD DATA	R/W	VS3V	GPIO 17 output data.
6	GP16_O DATA	R/W	VS3V	GPIO 16 output data.
5	GP15JD DATA	R/W	VS3V	GPIO 15 output data.
4	GP14JD DATA	R/W	VS3V	GPIO 14 output data.
3	GP13JD DATA	R/W	VS3V	GPIO 13 output data.
2	GP12_O DATA	R/W	VS3V	GPIO 12 output data. If this pin serves as IRQ/SMI*, this bit has no effect.
1	GP11_O DATA	R/W	VS3V	GPIO 11 output data.
0	GP10JD DATA	R/W	VS3V	GPIO 10 output data.

7. GPIOx Input Status Register - Index 12h

Table B.7: Index 12h

Bit	Name	R/W	PWR	Description
7	GP17_P STS	RO	VSB3V	Read the GPIO17 data on the pin.
6	GP16_P STS	RO	VSB3V	Read the GPIO16 data on the pin.
5	GP15_P STS	RO	VSB3V	Read the GPIO15 data on the pin.
4	GP14_P STS	RO	VSB3V	Read the GPIO14 data on the pin.
3	GP13_P STS	RO	VSB3V	Read the GPIO13 data on the pin.
2	GP12_P STS	RO	VSB3V	Read the GPIO12 data on the pin.
1	GP11_P STS	RO	VSB3V	Read the GPIO11 data on the pin.
0	GP10_P STS	RO	VSB3V	Read the GPIO10 data on the pin.

System Assignments

- System I/O ports
- DMA channel assignments
- Interrupt assignments
- 1st MB memory map

Appendix C System Assignments

C.1 System I/O ports

Table C.1: System I/O ports

Addr. range	
(Hex)	Device
000-00F	DMA controller
020-03F	Interrupt controller 1, (master)
040-05F	Timer/counter
060-06F	(keyboard controller)
070-07F	Real-time clock, non-maskable interrupt (NMI)
	Mask
080-09F	DMA page register
0A0-0BF	Interrupt controller 2 (slave)
0C0-0DF	DMA controller
0F0	Clear math co-processor
0F1	Reset math co-processor
0F8-0FF	Math co-processor
1F0-1F7	Primary IDE channel
200-207	Game I/O
274-279	ISAPNP Read Data Port
2F8-2FF	Serial port 2
378-37F	Parallel printer port 1 (LPT1)
3B0-3DF	Intel 915GM Express Chipset Family
3F0-3F5	FDD Controller
3F8-4D1	Serial port 1
500-51E	Intel 82801 SMBus Controller– 266A
D000-D03F	Network connection
E000-E01F	Intel 82801 USB Host Controller - 2658
E100-E11F	Intel 82801 USB Host Controller - 2659
E200-E21F	Intel 82801 USB Host Controller - 265A
E300-E31F	Intel 82801 USB Host Controller - 265B

C.2 DMA channel assignments

Table C.2: DMA channel assignments

Channel	Function
0	Available
1	Available
2	Floppy disk (8-bit transfer)
3	Available
4	Cascade for DMA controller 1
5	Available
6	Available
7	Available

C.3 Interrupt assignments

Table C.3: Interrupt assignments

Interrupt#	Interrupt source
NMI	Parity error detected
IRQ 0	Interval timer
IRQ 1	Keyboard
IRQ 2	Available
IRQ 3	Serial communication port 2
IRQ 4	Serial communication port 1
IRQ 5	Available
IRQ 6	Diskette controller (FDC)
IRQ 7	Available
IRQ 8	Real-time clock
IRQ 9	Microsoft ACPI – compliant System
IRQ 10	Available
IRQ 11	Intel 82801 SMBus controller - 266A
IRQ 12	PS/2 mouse
IRQ 13	INT from co-processor
IRQ 14	Preliminary IDE
IRQ 15	Available
IRQ 16	HD Audio UAA bus driver / Intel 915GM Express Chipset Family
USB and Ethernet IRQ is automatically set by the system	

C.4 1st MB memory map

Table C.4: 1st MB memory map

Addr. range (Hex)	Device
F000h - FFFFh	System ROM
E000h - EFFFh	Reserved for BIOS boot
CC00h - DFFFh	available
C000h - CB00h	VGA BIOS
B800h - BFFFh	CGA/EGA/VGA text
B000h - B7FFh	Reserved for graphic mode usage
A000h - AFFFh	EGA/VGA graphics
0000h - 9FFFh	Base memory
*default setting	

